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A DESTRUCTIVE FOREST FIRE AND SOME OF ITS IMPLICATIONS

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On the afternoon of September 17, 1932, between 12:30 and 3 o'clock, a forest fire burned over 60 acres of timberland in an area known as the Elk Pasture, 3 miles north of Urania, in LaSalle Parish, northern Louisiana. This simple fact is not, in itself, remarkable, but the forest stand in which the fire burned was not a common class of stand. The fire was extraordinarily severe, and killed practically every tree on the 60 acre s. And the implications, conjectures, and controversies raised by these circumstances are of interest and importance to all those in the South who own or manage second-growth stands of longleaf pine.

The fire occurred on land belonging to the Urania Lumber Company, a company that has been outstandingly successful in its fire protection work. Indeed, so successful has been the protection in Elk Pasture that up to September 1932 this particular 60 acres had not previously burned since 1913, 19 years before. Mr. Henry E. Hardtner, president of the company, has been actively interested in forest conservation for many years, and several tracts of his property have now been completely free from fire for periods of at least 15 or 20 years.

Elk Pasture, a tract of about 1,500 acres, was forested with virgin longleaf pine at the time of logging, about 1904. An average of 10 residual longleaf pines and one residual loblolly pine per acre, trees that were too small to be utilized at the time of logging, were still standing in 1932. The first major longleaf seed crop following logging occurred in or about 1906 but failed to establish a new stand. The reasons for this failure are not definitely known. Hogs were undoubtedly an important factor and fire was probably also of considerable importance. The major longleaf seed crop of 1913 was largely successful in restocking the area. Fire protection was inaugurated in that year, and in 1916 the tract was fenced against hogs and cattle. During the next 16 years, with nearly perfect protection from both hogs and fire, a fine second-growth pine stand developed which in 1932 averaged about 900 saplings per acre.

In 1932, on about one fourth of Elk Pasture, longleaf saplings composed about 90 percent of this young stand and loblolly saplings about 10 percent. On the other three fourths of the tract, longleaf composed only about 20 percent of the young stand and loblolly the remaining 80 percent. On the 60 acres burned in September 1932 the average ratio of longleaf to loblolly was approximately 60 to 40, but individual portions of the stand were either predominantly longleaf or predominantly loblolly. The longleaf saplings ranged from 1 to 6 inches in diameter breast-high and from 10 to 40 feet high. The loblolly saplings ranged from 1 to 10 inches in diameter breast-high and from 15 to 50 feet high. In addition to these well-established pine saplings there were about 100 scrubby hardwoods, 1 to 4 inches in diameter breast-high, on an average acre. Principally in the predominantly longleaf stands, there were also hundreds of small, overtopped longleaf seedlings per acre, almost entirely from the 1920 seed crop.

Thus the picture of the average acre in 1932 included some 11 pine seed trees, ranging from 6 to 22 inches in diameter breast-high, 900 pine saplings, 100 hardwood saplings, and several hundred small, overtopped pine and hardwood seedlings. To complete the picture as it actually appeared in 1932, we must also add numerous brushy shrubs, intricate tangles of vines, and scattered tufts of grasses and sedges. The most common and largest shrub was wax myrtle, which commonly reached a height of 6 to 8 feet, and which became firmly and abundantly established in the period between logging and the establishment of a stand of young pines. As the young pines overtopped them, many of these shrubs died but continued to stand for many years. The final element in the picture is a mantle of dead pine needles or "straw" that covered the ground to an average depth of 3 inches where unsupported by bushes or tufts of grass. This mantle was spread generously over small bushes and tufts, creating highly inflammable domes from 6 inches to 2 feet high, and was draped abundantly over the lower dead branches of the pine saplings and over the branches, both dead and living, of the larger shrubs and small hardwoods. The irregular character of the stand, the intricate intermingling of dead and living vegetation of all heights up to 50 and sometimes to 100 feet, and the curtain-like character and arrangement of the pine straw and the leafy vines, all contributed to the development and maintenance of a serious fire hazard that endangered the entire stand during periods of dry, windy weather.

Such were the conditions on the morning of September 17, 1932. According to Weather Bureau records, the spring and summer of 1932 had been relatively dry at Urania. No rain had fallen during the 12-day period from September 5 to September 16, inclusive. The maximum daily temperature during this dry period had ranged from 86° to 97° F., and had averaged about 90° F. On September 17, 1932, the maximum temperature was 98° F., the sky was partly cloudy, and there was a brisk but intermittent northwest wind.

Thus was the stage set. About 12:30 p.m., a fire was discovered and reported along the railroad right-of-way that bisects Elk Pasture. From then until 3 p. m., when the fire was definitely under control and almost out, undeniable facts are difficult to establish. Honest differences of opinion exist as to whether or not the fire could have been put out or controlled before it crowned and whether the fire crew was sufficiently large, properly equipped, and thoroughly efficient in action. Even eye-witness accounts of the fire are apt to be colored by the very rapidity of the action and made unreliable by the impossibility of making calm, unhurried observations. Thus the actual fire will be passed over very briefly with mention only of the highlights--and even these are not entirely unassailable facts.

A former State fire warden, with 15 years' local experience in fire fighting, was first on the scene. He reached the fire while it was still burning in the grass of the railroad right-of-way and before it reached the boundary fence, 100 feet from the tracks, beyond which was the dense stand of pine. This man was unable to stop or control the fire and it passed through the fence and almost immediately crowned. About 35 men were at the fire by the time it reached the company's fireline, 100 yards inside the fence. These men held the fire at this fireline for a short time, but the fire soon crossed in so many places, aided by pine straw on the fireline and by strong gusts of wind, that the line was lost and the firefighters were forced to fall back. The fire raged fiercely through the crowns and it was said that the wind carried sparks 100 yards ahead of the main fire and that the flames often reached to the height of the larger pine seed trees. The fire was finally controlled by

back-firing and direct attack by about 2 o'clock, after the head had advanced into a stand composed principally of loblolly pine and hardwoods. By 3 o'clock only one man was left to patrol the fire.

The results of the fire are a matter of factual record. The burned area was carefully examined two weeks after the fire. The litter, ground cover, and practically all the shrubs, vines, and smaller hardwoods had been completely consumed. Scorched, blackened and partially or wholly defoliated pine and hardwood saplings and pine seed trees remained standing. Of the pine saplings, only 13 percent of the longleaf and 4 percent of the loblolly retained any green needles whatever. Of the longleaf pine seed trees, ranging from 6 to 22 inches in diameter breast-high, 10 percent were completely defoliated, 32 percent retained scorched foliage but had no green needles, and 58 percent had both scorched foliage and at least a few green needles. The soil would have been completely bare but for a light mantle of ashes.

At the time of this first examination, foresters and others who viewed the scene of the fire expressed widely differing opinions as to what the ultimate mortality of trees might be, but almost everyone present agreed that he had never seen a more destructive fire in longleaf pine. A reexamination of the area one year later showed a mortality in sapling pines of 100 percent and in longleaf pine seed trees of 95 percent. Two years after the fire, 96 percent of the original longleaf pine seed trees were dead. These figures apply to a sample area of 10 acres established at random near the middle of the burn. Here and there outside the sample area a few scattered pine saplings survived, particularly near the boundary of the burn. Near where the fire started and where it finally burned out, the mortality was considerably less than on the sample area, but varied greatly from one locality to another. Almost all of the hardwoods were killed back to the ground but sprouted during the 1933 growing season. The extremely high mortality was evidently not due to continued drought conditions after the fire, since there was a rainfall of 1.6 inches only 2 days later and a normal rainfall during the remainder of the fall and winter.

The facts concerning the Elk Pasture fire have now been related and a brief discussion of some of the implications raised by this fire seems pertinent. Because the fire caused such appalling damage to a stand completely protected from fire for 19 years, during which time an extreme hazard had been built up, complete exclusion of fire for long periods might well be considered unwise. In rebuttal it may be said that the fire burned only 60 acres, which is only a drop in the bucket when considering the extensive holdings of the Urania Lumber Company, and that this is the only very destructive fire of more than about 30 acres to have occurred in the long period of protection. At least three other destructive fires occurred in 1930 and 1931 in long-protected stands owned by the Urania Lumber Company, but these burned over only 14 to 33 acres each. Perhaps one can afford to take an occasional complete loss on a few acres in order to reap, on the remainder of his holdings, the benefits of greater growth and higher quality that are expected to accrue from complete protection.

A 60-acre fire is indeed so relatively small that some may consider it too insignificant to warrant or justify serious consideration. It is not unreasonable, however, to believe that what can and did happen on only 60 acres might sometime occur on more extensive areas, under more favorable fire conditions such as with a stronger, steadier, or more prolonged wind, or with an earlier start, or in less accessible stands. It is the threat, the strong possibility, that the 60-acre Elk Pasture fire may be repeated on a much larger scale that warrants serious consideration. Some will argue

that the protective organization might be built up, without undue expense, to such a point of efficiency that very destructive fires even as large as 60 acres could and would be largely eliminated. Again there is a ready rebuttal--that there are occasional fires that simply cannot be stopped or controlled within a reasonable time or area by any methods now in use and that under complete fire protection the danger and frequency of such fires will increase.

These are highly controversial subjects and strong arguments can be presented for each side. Before concluding the discussion, however, let us glance briefly at the two obvious extremes of the fire question in the longleaf pine type and at possible intermediate positions. At the one extreme is complete absence of fire protection, with annual or at least relatively frequent, entirely uncontrolled fires. The results of this policy are amply demonstrated on millions of acres of forest lands in the South. The stands of timber or of reproduction are generally very much understocked and incomplete, occasionally absent altogether, and growth and quality are generally lowered by severe or long-continued defoliation of the crowns and scarring of the stems. At the other extreme is complete exclusion of fire, with the attendant development under certain circumstances (as we have seen) of an extreme fire hazard and the very real possibility of complete or almost complete loss when an accidental fire occurs in very dry, windy weather.

Between these two extremes lies the practice of periodic controlled burning. This practice consists of deliberate burning, under controlled, selected conditions that preclude the possibility of serious damage, usually for the specific purpose of destroying grass, underbrush, vines, pine straw, etc., that would otherwise accumulate and constitute a high fire hazard. Other purposes, which will sometimes be primary rather than secondary, may be to prepare the ground or improve the surface conditions for desirable reproduction, to reduce the competition of associated vegetation such as dense grasses, and to reduce the brown-spot needle disease which attacks longleaf pine seedlings. Controlled, selected conditions will often mean burning at night, during the winter, when the soil is moist, in limited areas bounded by natural or constructed firelines, and with a fire crew present. Such controlled burning might be practical at, say, 3- to 5-year intervals, depending on the purpose and on the rate of accumulation of the vegetation that constitutes the principal fire hazard.

Periodic controlled burning in the longleaf pine type seems a more logical practice than either of the two extremes--especially the extreme of no protection at all. But it is not as easy to apply in practice as it is to discuss on paper. The stands and conditions must be carefully selected, and many different circumstances must be taken into account. Above all, there is at present a lack of definite information on the practice. Its ultimate results and effects are not known, and will not be known until thorough, long-continued investigations have been completed. Until then, periodic controlled burning may be considered a very promising and very logical practice, but one that should not be used without full understanding of its applications and possible results.

The Elk Pasture fire raises questions that are not readily answered, and implies problems that are not easily solved. These questions and problems, concerning the proper use and relation of fire and protection in the longleaf pine type, constitute a controversial subject of great importance to foresters and timberland owners in the South. The Southern Forest Experiment Station is endeavoring to obtain and interpret the basic facts.